Dorado

DORADO PRO - EXPERT SERVICE MANUAL

manitou

Table of Contents

Section	Page Number
Table of Contents	1
Introduction and Required Tool List	2-3
Damping Leg Service – Disassembly	4-9
Damping Leg Service - Assembly	10-12
Air Leg Service - Disassembly	13-14
Compression Rod Service	15-19
Air Leg Service - Assembly	20-21
Dust and Oil Seal Replacement	22-23
Exploded Diagram & Parts List	24
O-Ring Placement Diagrams	25-28

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INTRODUCTION

This manual is intended to guide the user through basic service of Manitou Dorado Pro and Expert front forks. We highly suggest the service on these forks be performed by an experienced suspension mechanic. Service is supported by the identification of common parts and assemblies that have been assembled into Service Kits. The purpose of this manual will be to describe conditions that may drive the need for service and to provide installation instructions for the kits.

Due to the time-consuming nature of suspension fork service, at this time our primary focus is to offer service kits that minimize the amount of downtime and labor involved. Please read through the manual carefully before beginning the service of your fork. The Dorado fork service is considerably more involved than a standard fork service and having a basic understanding of the tasks you are about to perform will assist you greatly in the disassembly and re-assembly of your fork.

Please read through the required tools page and be sure you have all of the items you will need for the service of your fork. The guide is designed to be used with the Dorado Service kit which includes all O-rings and seals to overhaul the fork. The part number for the kit is 141-25995.

For any assistance with the service of your Dorado please contact our Technical Service Department at 888-686-3472 and email them at techsupport@hayesbicycle.com

GENERAL WARNING: Suspension forks by design can contain preloaded springs, gases and fluids under extreme pressure and warnings contained in this manual must be observed to reduce the possibility of injury or possible death. Following these instructions can help you reduce the risk of being injured. Any questions in regards to the information in this manual should be directed to Manitou Customer Service at (888) 686-3472.

CAUTION: Suspension forks use precision machined aluminum and other soft alloy components. Using correct tools for assembly is essential to prevent damage.

REQUIRED TOOLS

Below is a list of tools that will be used in the complete service of a Dorado Pro/Expert fork.

Dorado Clamp Blocks – Manitou Part Number 172-25077
Dorado Seal Press – Manitou Part Number 172-29862
Dorado Service Kit – Includes all O-rings and seals for service. Part number 141-25995
M-Prep Grease – Manitou Part Number 85-0031
Semi-bath Oil – Manitou Part Number 85-0023
5wt Fork Oil

Torque Wrench
36mm Wrench or Socket (an adjustable wrench can be used instead but care must be taken to not damage the top caps.)
12mm Combination Wrench
13mm Combination Wrench
20mm Combination Wrench
20mm Crow's Foot
2mm Allen Wrench
2.5mm Allen Wrench
5mm Allen Wrench
6mm Allen Wrench
26mm Socket with ratchet
Small Flat Blade Screwdriver
Needle Nose Pliers
Pick or similar tool for removing O-rings
Blue Loctite
Safety Glasses
Isopropyl Alcohol

Damping Leg Service

Disassembly

1. First step is to loosen the damping leg top cap using a 36mm wrench. It helps if the leg is still clamped in the lower crown assembly while breaking the top cap loose (be sure the upper crown is loosened, you only want the lower tightened when breaking loose the top cap). Only loosen the top cap at this point. Do not remove it. **(FIG. 1)**

FIG. 1

2. Loosen the pinch bolts on the lower crown and remove the damping leg from the fork. You will need to remove the frame bumpers to do so. Put them in a safe place so you do not misplace them.

3. Clamp the upper sleeve of the fork in bike stand.

4. Remove the top cap from the fork leg using a 36mm wrench. The top cap is still attached to the rebound shaft at this point.

5. You will now remove the top cap from the rebound shaft. Place a 12mm wrench on the flats of the rebound shaft and use a 36mm wrench to unthread the top cap from the shaft. **(FIG. 2)** Once the top cap is unthreaded, remove the rebound knob from the top cap.

FIG. 2

6. Remove the fork leg from the bike stand and pour the oil out of the leg. **(FIG. 3)** Slide the inner leg out of the outer leg and leave the outer leg to drain in a drainage pan.

7. Holding the inner leg over a drainage pan, stroke the rebound shaft several times to drain the rest of the oil from the inner leg.

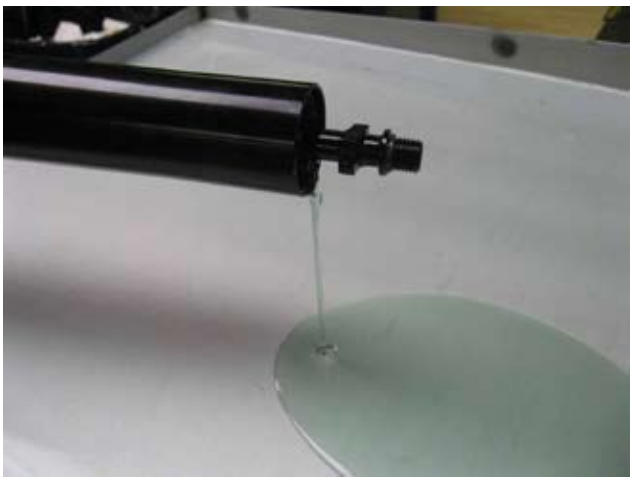


FIG. 3

8. Wrap the inner leg in a rag and lightly clamp it into a bike stand with the rebound shaft pointing down towards the floor.

9. Using a 2mm Allen wrench, remove the TPC+ adjuster knob. Remove O-ring and be sure you capture the 2 detent balls and springs under the knob. **(FIG. 4, 5 & 6)**

10. Next you will remove the High Speed adjuster knob. Remove the c-clip that holds the knob on using a small flat blade screwdriver or similar tool. **(FIG. 7)** Once the c-clip is removed pull the knob up. Be sure to capture the O-ring, 2 detent balls and springs under the knob. **(FIG. 8)**

FIG. 6

FIG. 4

FIG. 7

FIG. 5

FIG. 8

11. Remove the damping cartridge from the inner leg using a 26mm socket. Pull the damping cartridge completely out of the inner leg. **(FIG. 9 &10)**

12. You will notice the damping cartridge has two larger diameter sections at the ends. These are called the Outer Cartridge Adapters. Using the Dorado Clamp Blocks (Part # 172-25077), clamp the outer cartridge adapter on the rebound end in a vise.

13. Using a 20mm wrench, remove the rebound damper from the cartridge. (The inner cartridge tube will come out with either the rebound assembly or compression assembly. If it comes out with the rebound, pull the tube off of the assembly.) **(FIG. 11 & 12)**

FIG. 10

FIG. 11

FIG. 9

FIG. 12

14. Replace the following O-rings on the rebound damper assembly. You can also refer to the Rebound Assembly Diagram on Page 23 to see the placement of the O-rings on the assembly.

A. O-ring #064962 - This is the O-ring above the threads on the end of the damper assembly. **(FIG. 13)**

B. O-ring #100-121 - This is the larger O-ring on the bottom out end cap. **(FIG. 14)**

C. O-ring #100-014 - This is the smaller O-ring on the bottom out end cap. **(FIG. 15)**

FIG. 13

FIG. 14

FIG. 15

15. Clamp the outer cartridge adapter on the compression damper side using the Dorado Clamp Blocks. **(FIG. 16)**

16. Remove the TPC+ Compression assembly from the cartridge using a 26mm socket. (The inner cartridge tube will come out with either the rebound assembly or the compression assembly. Pull the tube off of the assembly.) **(FIG. 17 & 18)**

17. Remove the top cap and nylon washer from the assembly. This is required to replace the O-rings included in the service kit for the compression assembly. **(FIG. 19)**

FIG. 17

FIG. 16

FIG. 19

FIG. 18

18. Replace the following O-rings on the compression assembly top cap.

A. O-ring # 08-29433-L026 - This is the O-ring that is around the outside of the compression assembly top cap. **(FIG. 20)**

B. O-ring # 100-023 - This O-ring is located in an inside groove in the top cap. It is directly behind the two pins. **(FIG. 21)**

C. O-ring # 101-1250-200 - This O-ring is located just below the top opening on the top cap where the adjuster slides through. **(FIG. 22)**

19. Press the top cap back onto the compression assembly. **(FIG. 23)**

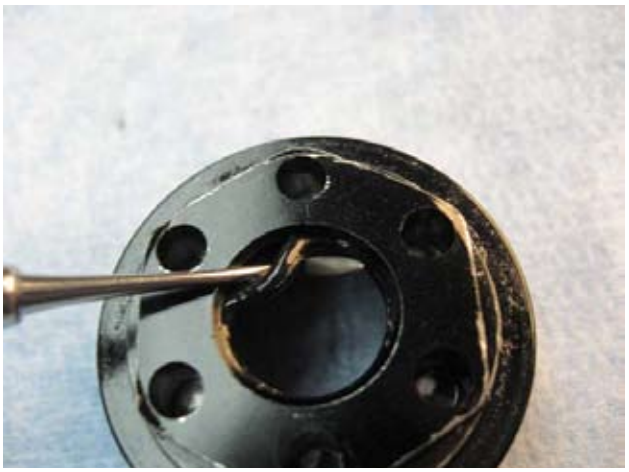


FIG. 22

FIG. 20

FIG. 23

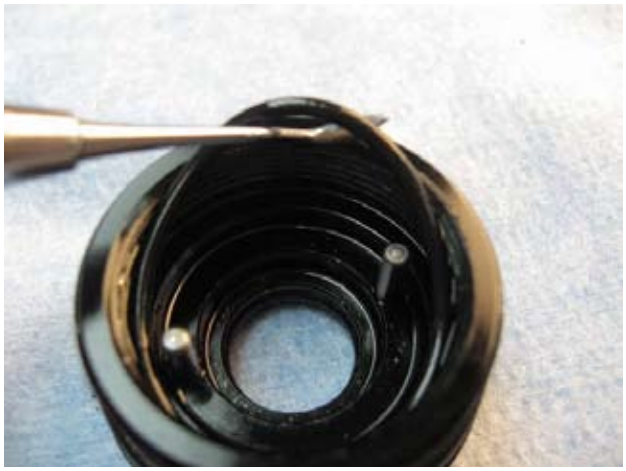


FIG. 21

Damping Leg Service

Assembly

1. Inspect the inner and outer damper tubes and be sure they are free from debris and contaminants.

2. Press the inner damper tube onto the rebound assembly.

3. Clean the threads on the outer cartridge adapter with isopropyl alcohol and apply Blue Loctite to the threads. Install the rebound damper assembly into the outer cartridge. Only tighten to hand tight at this point.

4. Clean the threads on the second outer cartridge adapter and apply blue Loctite to them. Install the TPC+ compression assembly into the cartridge.

5. Using a 26mm socket and 20mm wrench, tighten both the compression assembly and rebound assembly to 6.8 Nm (60 in lbs). **(FIG. 1 &2)**

6. Put a small amount of Prep M grease on the O-ring on the rebound end of the damper cartridge assembly. Install the assembly in the inner leg by sliding it into the bottom of the leg. Use a 26mm socket to tighten it into the leg. Tighten to 6.8 Nm (60 in lbs). **(FIG. 3)**

FIG. 1

FIG. 2

FIG. 3

7. Insert the detent springs into opposite holes in the end cap and place the detent balls on top of the springs. To hold the detent balls in place on the spring use a small dab of grease. **(FIG. 4)**

8. Install the high speed adjuster onto the end cap. Be sure that O-ring # 100-025 below the adjuster is in place and greased. **(FIG. 5)** Secure the adjuster with the c-clip.

9. Insert the springs into opposite holes on the TPC+ adjuster knob and then place the detent balls in the corresponding holes of the high speed adjuster knob. **(FIG. 6)** Place O-ring # 100-024 around the TPC+ knob and apply a small amount of grease to it. **(FIG. 7)**

10. Install the TPC+ adjuster knob onto the end cap and secure with the 2mm screw. **(FIG. 8)**

FIG. 6

FIG. 4

FIG. 7

FIG. 5

FIG. 8

11. Replace the oil and dust seals on the outer leg following the directions on pages 22-23. Inspect the inside of the outer leg and the outside of the inner leg and be sure they are free from debris and contaminants. Lube the oil seal and dust wiper on the outer leg with a small amount of Prep M grease. Slide the inner leg into the outer leg and clamp into the bike stand.

12. Replace O-ring # 100-027 on the top cap **(FIG. 9)**

FIG. 9

13. Install the top cap onto the end of the rebound shaft. Use a 36mm wrench and a 12mm wrench to tighten to the proper torque of 6.8-9.0 Nm (60-80) in lbs).

14. Install the rebound knob into the top cap by snapping it into place. Fully close the rebound by turning the knob clockwise.

15. Fully extend the rebound shaft, pulling the inner leg up into the outer leg.

16. Pour damper oil (5wt fork oil) into the leg. Stroke the rebound shaft to bleed the system and release the air. You want to stroke the rebound shaft a few times with the rebound fully closed, then turn the rebound knob open two clicks counterclockwise. Stroke the rebound shaft another 15-20 times and the system will be bled. **(FIG. 10)**

FIG. 10

17. Once the system is bled you need to set the oil height in the leg. The oil height is 110mm. You measure this by measuring down from the top of the outer leg to the top of the oil. You want the inner leg fully compressed into the outer leg when measuring. **(FIG. 11)**

18. After you have properly set the oil height fully extend the inner leg and tighten down the top cap using a 36mm wrench to the proper torque of 6.8-9.0 Nm (60-80 in lbs).

FIG. 11

19. Reinstall the damping leg into the fork crowns on the bike.

Air Spring Leg Service

Disassembly

1. First, the air pressure needs to be released from the system. Remove the air cap from the top of the fork leg, and release the air pressure using a shock pump. **(FIG. 1)**

2. The air spring leg top cap needs to be loosened. Loosen the pinch bolt on the top crown, and crack the top cap loose with a 36mm wrench. **(FIG. 2)**

3. Loosen the pinch bolts on the lower crown, and remove the leg from the fork. Be sure not to misplace the frame bumper that will need to come off the fork leg. **(FIG. 3)**

4. Lightly clamp the fork leg in a bike stand. Remove the top cap from the leg with a 36mm wrench. Remove the top cap from the compression rod with a 13mm wrench on the top of the compression rod and a 36mm wrench. **(FIG. 4)**

FIG. 1

FIG. 2

FIG. 3

FIG. 4

5. Pour the fluid out of the leg, and slide the inner leg out of the outer leg. Remove the outer leg from the stand and let it sit above a drainage pan. **(FIG. 5)**

6. Wrap the inner in a rag and clamp it lightly in the bike stand with the compression rod pointing towards the ceiling.

7. Loosen the Compression Rod Assembly from the inner leg with a 20mm wrench. **(FIG. 6)**

8. Remove Compression Rod Assembly from the inner leg. Note: there will be a small amount of Semi-bath oil on top of the piston. **(FIG. 7)**

FIG. 5

FIG. 6

FIG. 7

Compression Rod Service

This section covers the complete tear down and rebuild of the air spring compression rod in the air leg of the fork.

1. Using the Dorado Clamp Blocks (Part # 172-25077), clamp the compression rod in a vise. Be sure to clamp the compression rod near the end or below the air piston. Do not clamp in the middle of the shaft. **(FIG. 1)** Do not clamp the rod in a vise without the clamp blocks. Doing so will damage the rod rendering it unusable.

2. Next you need to unthread the poppet from the valve shaft. Insert a 2.5mm Allen wrench into the center hole of the air piston. **(FIG. 2 & 3)** You may have to turn and push lightly on the wrench until you feel it engage the Allen head inside the shaft. Turn the wrench counter-clockwise. You will notice as you are turning the wrench the valve shaft is moving out of the valve housing on the other end of the compression rod. **(FIG. 4)** Keep turning the wrench until the valve shaft stops moving out of the housing.

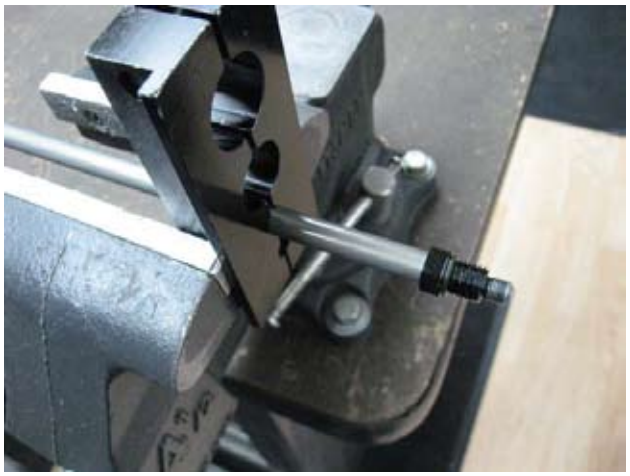


FIG. 1

FIG. 2

FIG. 3

FIG. 4

3. Using a 13mm wrench unthread the valve assembly off of the compression shaft and remove the air valve shaft from the compression rod shaft. **(FIG. 5 & 6)**

4. Slide the travel spacer, bottom-out bumper and end cap off of the compression shaft. **(FIG. 7)**

5. Using a 6mm Allen wrench unthread the air piston off of the compression shaft. (**FIG. 8)** Be careful when removing the piston as there is a small spring in the shaft under the piston. **(FIG. 9)**

FIG. 7

FIG. 5

FIG. 8

FIG. 6

FIG. 9

6. Insert the valve shaft back into the compression rod shaft and use it to push the poppet out of the other end of the compression rod shaft. **(FIG. 10 & 11)**

7. Replace O-rings #101-350-150 on the poppet. **(FIG. 12)**

8. Replace O-ring #100-214 on the air piston. **(FIG. 13)**

FIG. 12

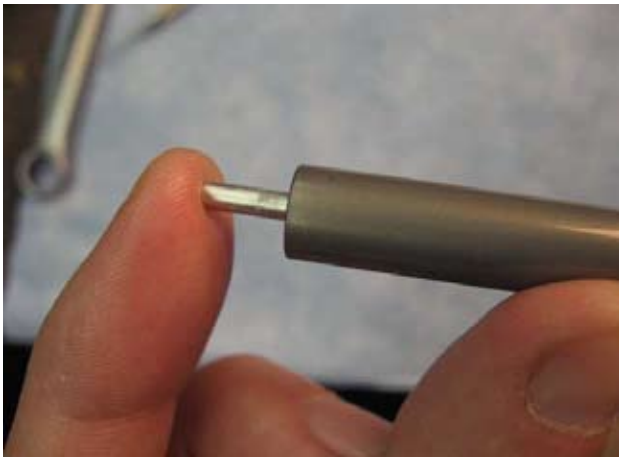


FIG. 10

FIG. 13

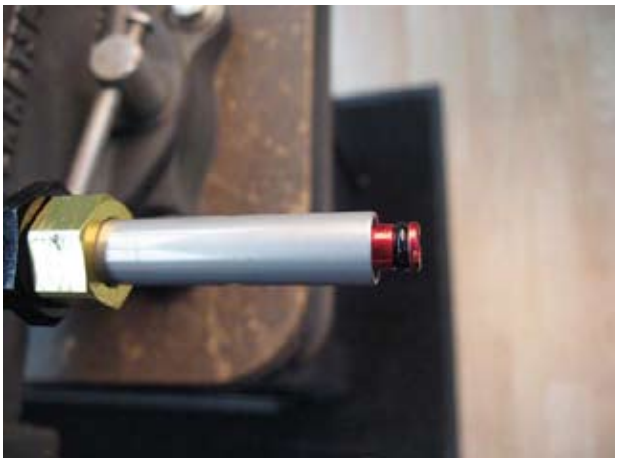


FIG. 11

9. Replace O-rings 100-026 and 100-110 on the end cap. **(See Page 26, FIG A)** Install the end cap, bottom-out bumper and the travel spacer back onto the compression rod shaft. **(FIG. 14 & 15)**

10. Apply a small amount (too much Loctite will clog the air shaft assembly) of red Loctite to the threads of the valve assembly. **(FIG. 16)** Lightly grease valve shaft and insert both the valve shaft and valve assembly into compression rod. Tighten to 45 -55 in lbs [5.1 - 6.2 Nm] **(FIG. 17 & 18)**

FIG. 16

FIG. 14

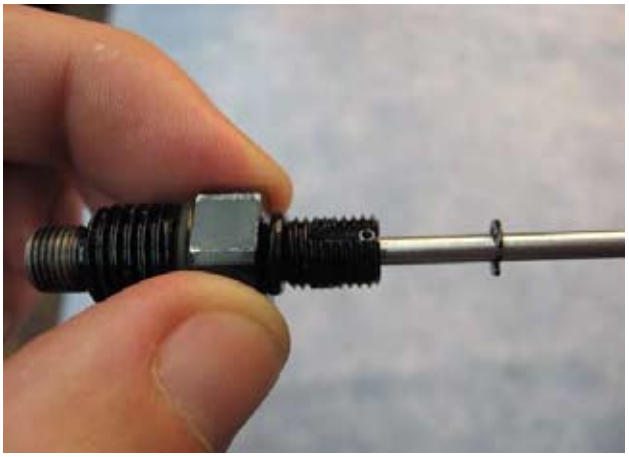


FIG. 17

FIG. 15

FIG. 18

11. Replace O-ring #064962 on the threaded end of the compression rod shaft. **(FIG. 19)**

12. Insert poppet into compression rod shaft. **(FIG . 20)**

13. Insert poppet spring into air piston and thread into compression rod shaft. **(FIG. 21)** Tighten air piston to 45-55 in lbs [5.1 - 6.2 Nm]

14. Insert a 2.5mm Allen wrench into the center of the air piston and push lightly until you feel it engage on the poppet. **(FIG. 22)** Turn the poppet clockwise, threading it onto the valve shaft. Tighten it until the valve shaft protrudes from the valve housing 1mm. **(FIG. 23)**

FIG. 21

FIG. 19

FIG. 22

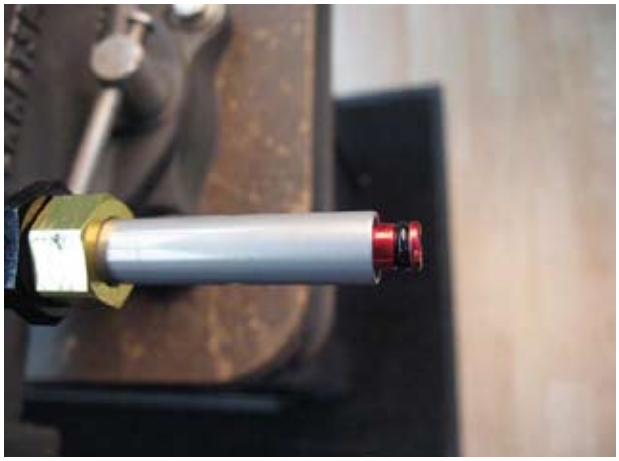


FIG. 20

FIG. 23

Air Spring Service

Assembly

1. Inspect the inner leg, inside and out, and be sure it is free from debris and contaminants.

2. Lube the air piston on the Compression Rod Assembly with a small amount of Semi Bath oil (5/40wt. Synthetic oil, P/N: 85-0023), and slide it into the top of the inner leg. **(FIG. 1)**

3. Inject 10cc of Semi Bath oil (5/40wt. Synthetic oil, P/N: 85-0023) into the inner leg on top of the air piston. **(FIG. 2)**

4. Use a 20mm crows foot to tighten the air spring end cap to the proper torque of 6.8-9.0 Nm (60-80 in lbs). **(FIG. 3)**

5. Replace the oil and dust seals on the outer leg following the directions on pages 22-23. Inspect the inside of the outer leg, and be sure it is free from debris and contaminants. Lube the oil seal and dust wiper on the end of the outer leg with Prep M grease (Ref Answer Products PN 85-0031). **(FIG. 4)** Slide the inner leg into the outer leg, and clamp the top of the outer leg in the bike stand.

FIG. 2

FIG. 3

FIG. 1

FIG. 4

6. Replace O-ring #100-027 on the top cap. **(FIG. 5)**

7. Install the top cap onto the end of the compression rod. Use a 36mm wrench and a 13mm wrench to tighten to the proper torque of 6.8-9.0 Nm (60-80 in lbs) **(FIG. 6)**

8. Inject 30cc of Semi Bath oil (5/40wt. Synthetic oil, P/N: 85-0023) into the outer leg on top of the inner leg. **(FIG. 7)**

9. Fully extend the inner leg and tighten down the top cap to the proper torque of 6.8-9.0 Nm (60-80 in lbs). **(FIG. 8)**

10. Fill the fork to the desired air pressure. (50-90psi)

FIG. 6

FIG. 7

FIG. 5

FIG. 8

Dust and Oil Seal Replacement

1. Using a pick or small blade screwdriver remove the wear ring from the outer leg. **(FIG. 1)**

2. Gently pry out the old dust seal from the outer leg. A tool we have found that works well is a downhill tire lever. If using a flat blade screwdriver to remove the seal be careful the tip of the blade does not catch on the lip inside the outer leg. **(FIG. 2)**

3. Using a pick or small flat blade screwdriver remove the retaining ring on top of the oil seal. **(FIG. 3)**

4. Gently pry out the old oil seal from the outer leg. **(FIG. 4)**

5. Place the new oil seal into the outer leg. Be sure the side with the lip and garter spring is facing upwards. Use the smooth side of the Dorado Seal Press to press in the new oil seal until it stops. **(FIG. 5 & 6)**

6. Place the retaining ring on top of the oil seal. Ensure that it snaps completely into the groove on the inside of the leg. **(FIG. 7)**

7. Place the new dust seal into the leg and use the knurled end of the Dorado Seal Press to press it complete into the leg. **(FIG. 8)**

8. Install the wear ring back onto the outer leg.

FIG. 1

FIG. 2

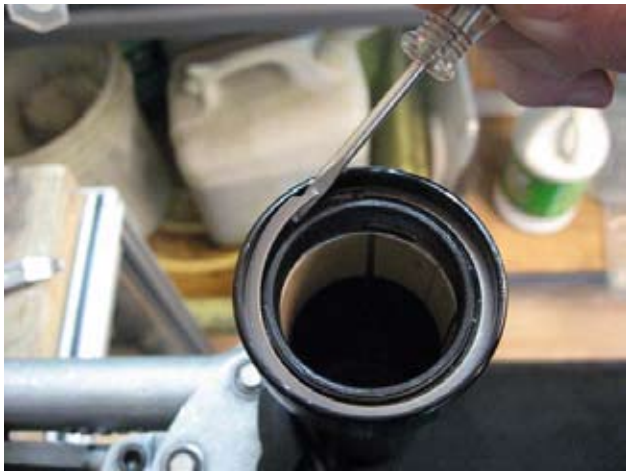


FIG. 3

FIG. 4

FIG. 7

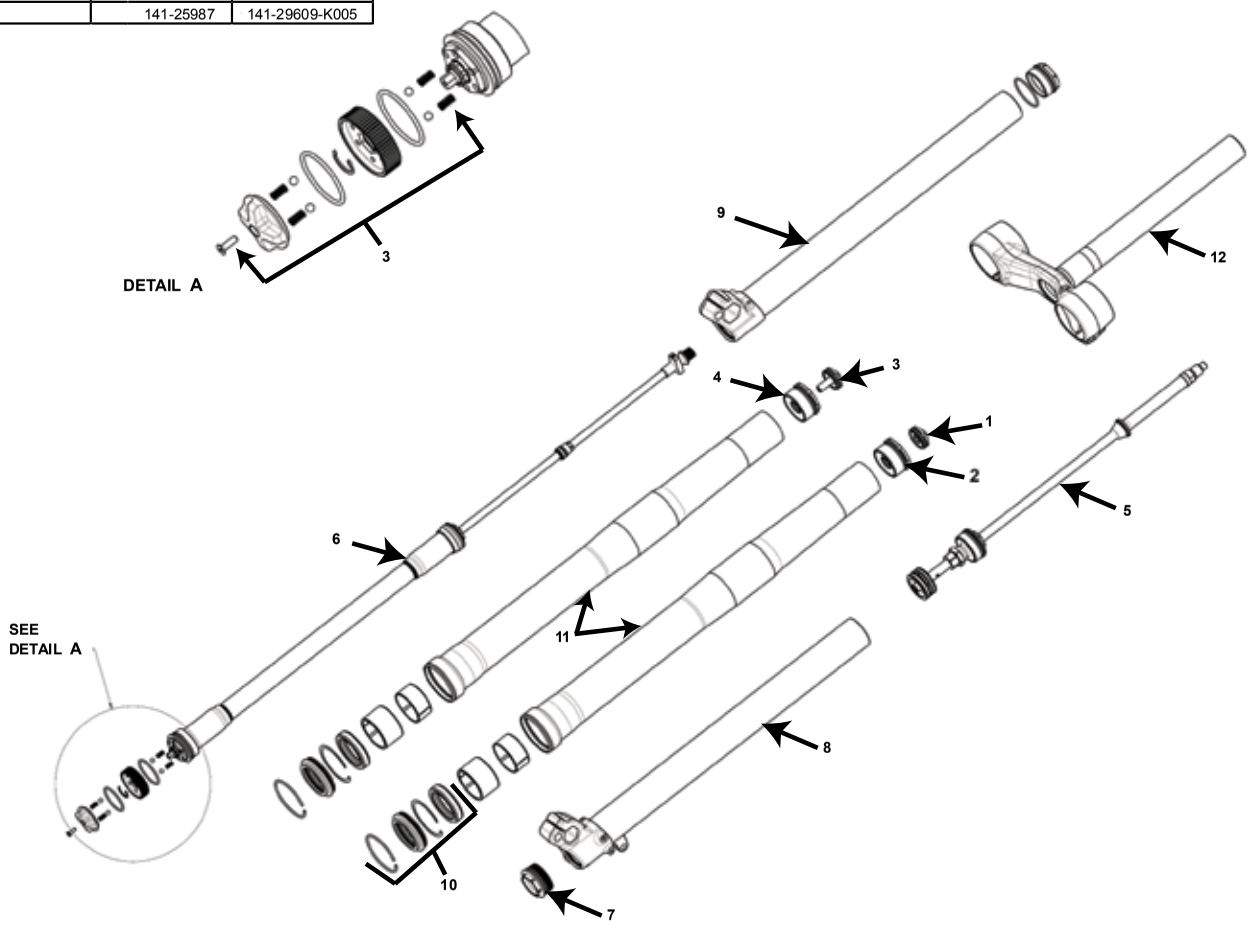
FIG. 5

FIG. 8

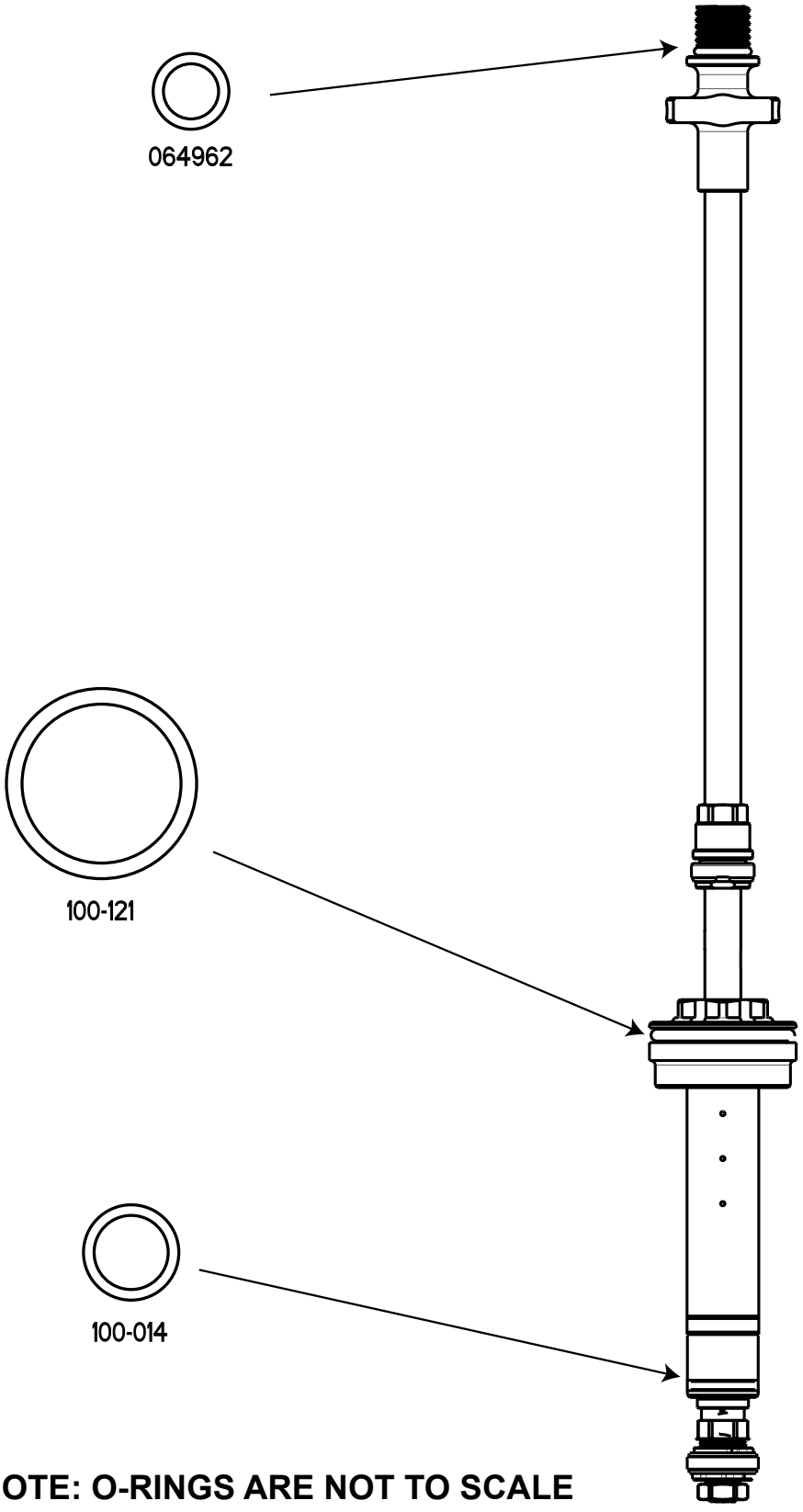
FIG. 6

DRAWING #	PART DESCRIPTION	DORADO PRO PART NUMBER	DORADO EXPERT PART NUMBER
1	Schrader Cap	141-25993	141-25993
2	Top Air Cap	141-24111	141-24111
3	Knob Kit	141-24109	141-24109
4	Rebound Top Cap	141-24801	141-24801
5	Compression Rod	141-25983	141-25983
6	Complete Cartridge (contains parts a, b and c assembled	141-24104	141-24104
a.	Compression Damper	141-24103	141-24103
b.	Rebound Damping Assembly	141-24102	141-24102
c.	Cartridge Tube	141-241222	141-241222
7	Bottom Air Cap	141-26018	141-26018
8	Left Inner Leg	141-25985	141-29609-K002
9	Right Inner Leg	141-25986	141-29609-K003
10	Complete Service Kit (also includes all o-rings)	141-25995	141-25995
11	Outer Leg	141-25982	141-29609-K004
12	Lower Crown/Steer	141-25987	141-29609-K005

DORADO EXPERT PART NUMBER	DORADO PRO PART NUMBER	PART DESCRIPTION
141-29609-K006	141-25988	Top Crown (Large)
141-29609-K007	141-25990	Top Crown (Small)
141-28073-K003	141-28073-K003	Leg Guards
141-24116	141-24116	Frame Bumpers
141-23817	141-23817	IS/Post Mount Brake Mount Brackets
141-24119	141-24119	Thru Axel w/end bolt
141-25991	141-25991	Thru Axel Hardware



REBOUND DAMPER ASSEMBLY
O-RING PLACEMENT



NOTE: O-RINGS ARE NOT TO SCALE

COMPRESSION ROD ASSEMBLY
O-RING PLACEMENT

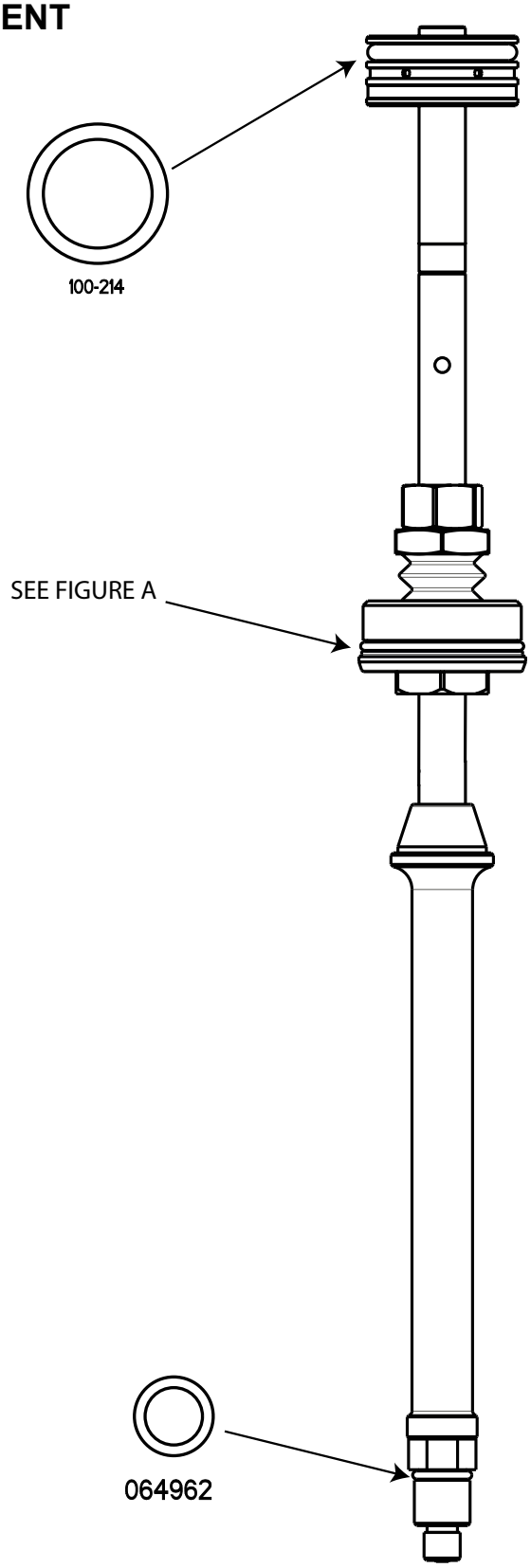


FIGURE A

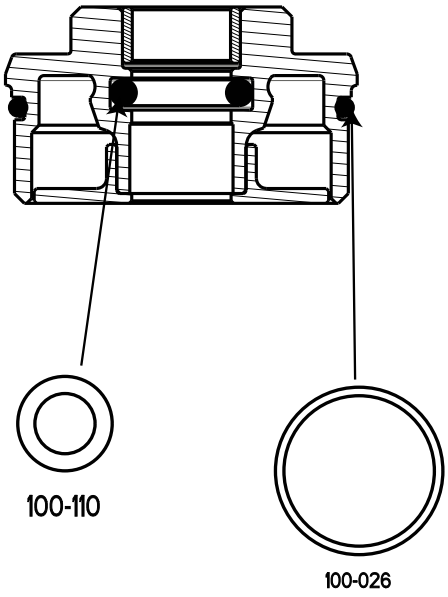
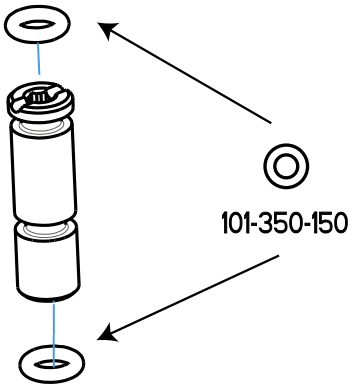


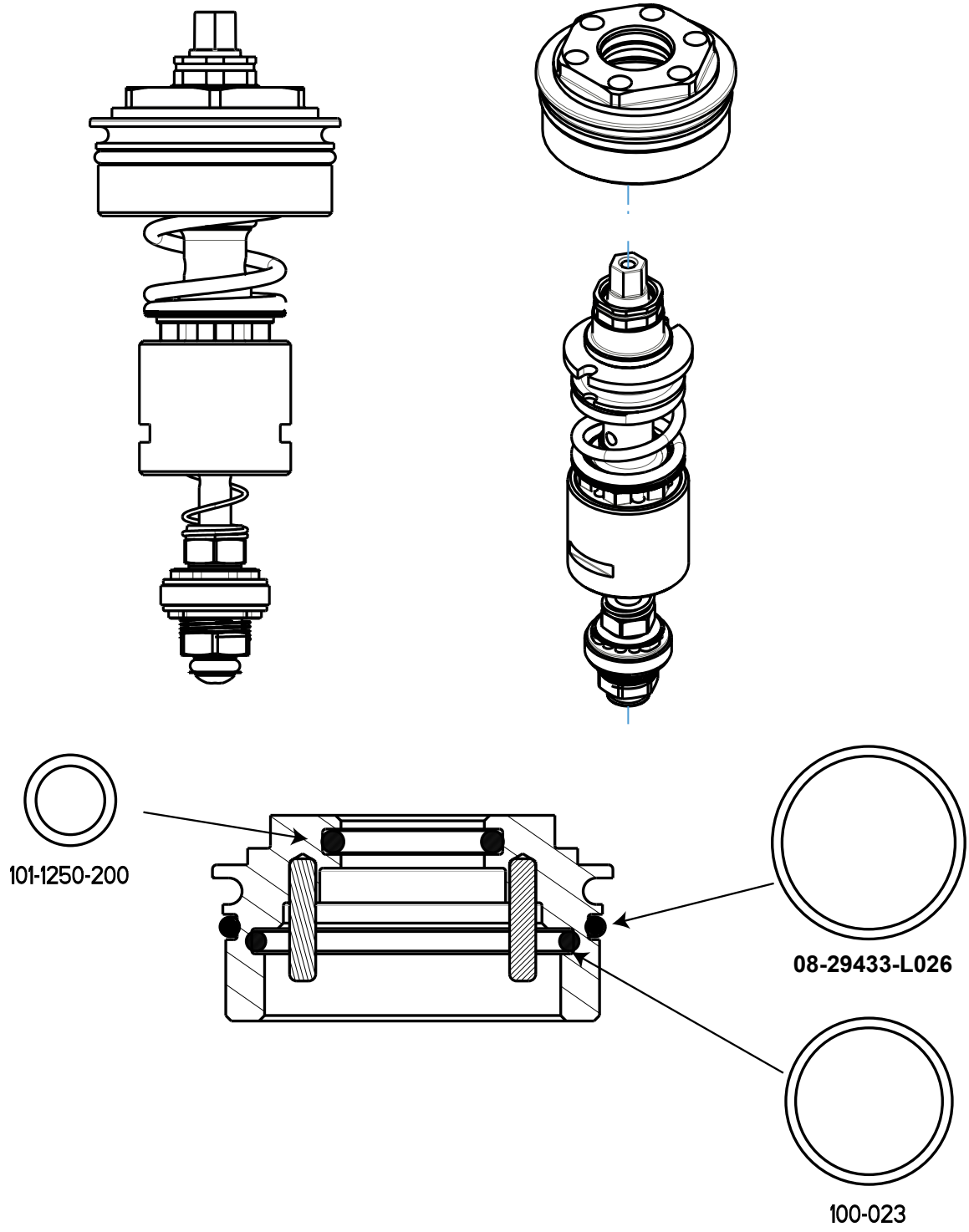
FIGURE B

This is the poppet that is located inside the compression damper shaft. Please see the service manual section that shows the dissasembly of the compression rod..



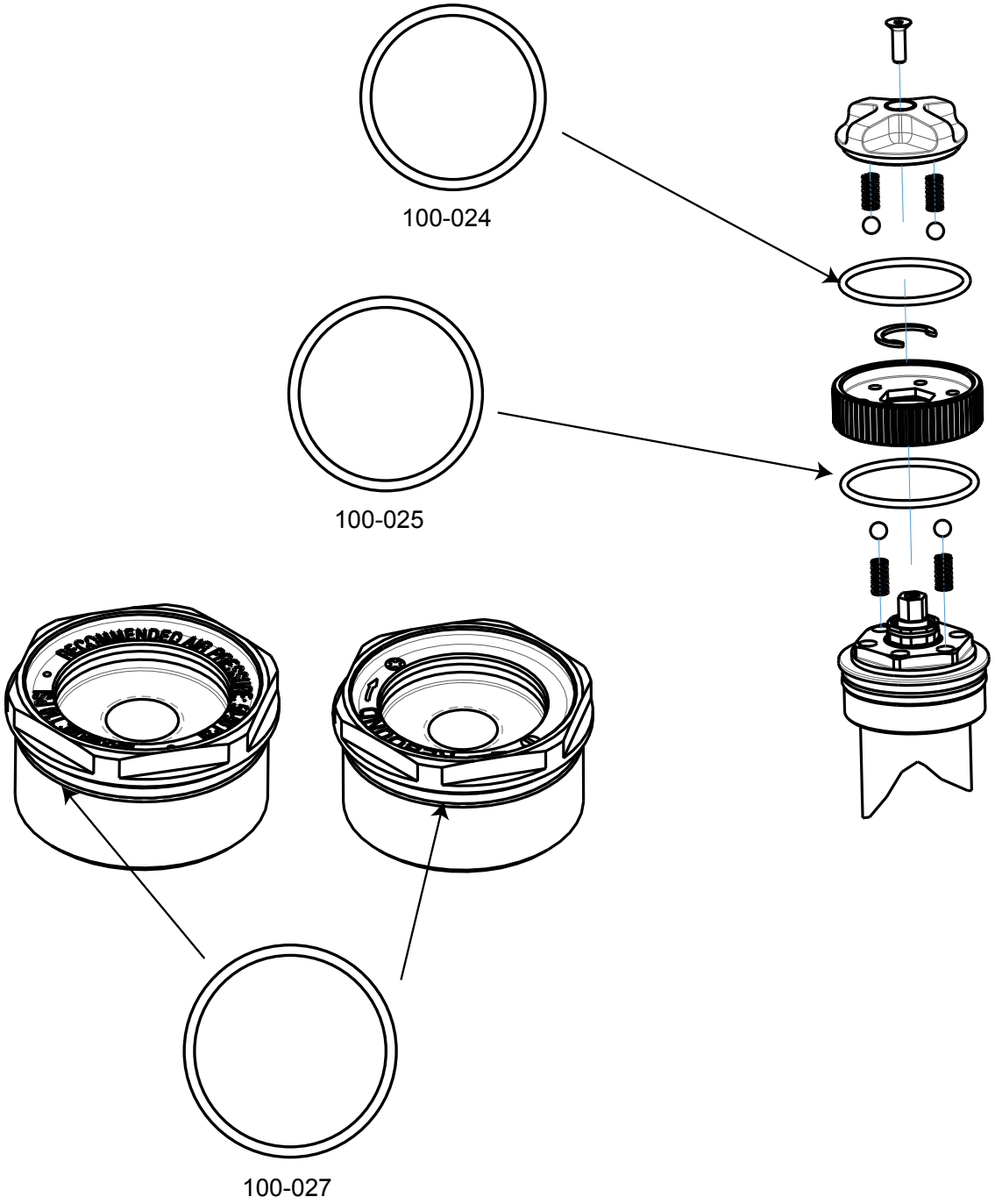
NOTE: O-RINGS ARE NOT TO SCALE

COMPRESSION DAMPER
O-RING PLACEMENT



NOTE: O-RINGS ARE NOT TO SCALE

TOP CAP & COMPRESSION DAMPER KNOB O-RING PLACEMENT



NOTE: O-RINGS ARE NOT TO SCALE